

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
17 June 2004 (17.06.2004)

PCT

(10) International Publication Number
WO 2004/051918 A1

(51) International Patent Classification⁷: H04L 9/00, G06K 15/00, H04N 1/40, 7/167, G06K 9/36, 9/46

[YU/US]; 12 Andrew Street #1, Providence, RI 02909 (US). SCHIFFNER, Norbert [DE/US]; 59 Adams Avenue, Barrington, RI 02806 (US).

(21) International Application Number: PCT/US2003/038151

(74) Agent: NELSON, Gordon, E.; 57 Central St., P.O. Box 782, Rowley, MA 01969 (US).

(22) International Filing Date: 26 November 2003 (26.11.2003)

(81) Designated States (national): AE, AG, AL, AU, BA, BB, BR, BZ, CA, CN, CO, CR, CU, DM, DZ, EC, GD, GE, HR, HU, ID, IL, IN, IS, JP, KP, KR, LC, LK, LR, LT, LV, MA, MG, MK, MN, MX, NI, NO, NZ, OM, PG, PH, PL, SC, SG, SY, TN, TT, UA, US, UZ, VC, VN, YU, ZA.

(25) Filing Language: English

(84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(26) Publication Language: English

Declaration under Rule 4.17:

(30) Priority Data: 60/429,634 27 November 2002 (27.11.2002) US

— of inventorship (Rule 4.17(iv)) for US only

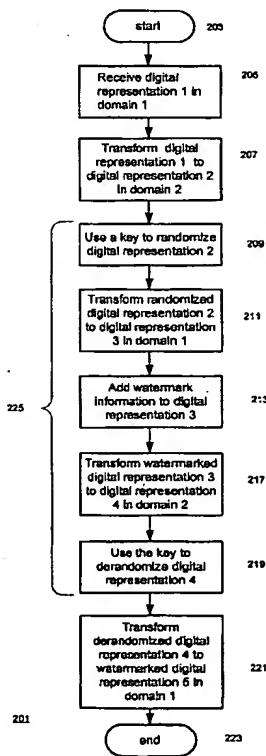
(71) Applicant (for all designated States except US): FRAUNHOFER-GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. [DE/DE]; Postfach 12 04 20, 80031 Muenchen (DE).

[Continued on next page]

(54) Title: WATERMARKING DIGITAL REPRESENTATIONS THAT HAVE UNDERGONE LOSSY COMPRESSION



WO 2004/051918 A1



(57) Abstract: Techniques for watermarking digital representations such as MPEG audio frames that spread the watermark information across the entire audio frame. The techniques work in conjunction with lossy compression techniques and are compatible with the perception models that are often used with lossy compression techniques. The watermark information is spread by means of transformations between the space/time domain and the frequency domain. When a MPEG audio frame is being watermarked, the compressed audio frame as it is produced by the quantizer is transformed from the frequency domain to the time domain; the time domain transformation is then randomized using a key and the randomized time domain transformation is transformed into the frequency domain. The watermark information is added at a predetermined frequency in the frequency domain transformation and the sequence of transformations is done in reverse order, with the randomization and derandomization serving to distribute the watermark information across the frequency domain representation of the watermarked audio frame.



Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.